

WHAT IS CLAIMED IS:

1. A method for measuring a position of an object according to an image of the object captured by a camera unit, the method comprising the steps of:

5 calculating a discrepancy of an incident beam of light penetrating a lens system of the camera unit relative to an optical center of the lens system; and compensating the position of the object according to the discrepancy.

2. A method for measuring a position of an object with a combination of an image of the object captured by a camera unit and calibration information, the calibration information being prepared in advance in such a manner that a position of a measurement pixel of the image is correlated with a direction of an incident beam of light and a displacement from a reference point to the incident beam, the method comprising the steps of:

15 (a) incorporating the image;
(b) detecting a position of a pixel representative of the object in the image incorporated at step (a); and
(c) calculating the position of the object according to the direction and the displacement of the incident beam, which are obtained from the calibration information with reference to the position of the pixel detected at
20 step (b).

3. An apparatus for measuring a position of an object according to an image of the object captured by a camera unit, the apparatus comprising:

25 an image input means for incorporating the image;

a pixel position detection means for detecting a position of a pixel

representative of the object in the image incorporated by the image input means;

a storage means for storing calibration information which correlates the position of the pixel with both a direction of an incident beam of light originating from the object and a displacement from a reference point to the incident beam; and

a position calculation means for calculating the position of the object according to the direction and the displacement of the incident beam, which are derived from the calibration information with reference to the position of the pixel detected by the pixel position detection means.

4. The apparatus according to claim 3, wherein the camera unit comprises cameras in sets of at least two so as to take a plurality of images and the storage means stores the calibration information for each camera.

5. The apparatus according to claim 3, wherein the pixel position detection means detects the position of the pixel representative of the object having a marker identifying a typical spot of the object.

6. The apparatus according to claim 3 further comprising a floodlight which projects a collimated beam of light on the object, wherein the camera unit captures an image of the object illuminated by the collimated beam, and the apparatus measures the position of the object according to spatial relationship between a position of the floodlight and an optical center of the camera unit as well as a position of the collimated beam on the image.

7. A computer program for a computer used for an apparatus, which generates calibration information correlating a position of a measurement pixel of an image captured by a camera unit with a direction of an incident beam of light and a displacement from a reference point to the incident beam of light, and measures a position of an object according to an image of the object captured by the camera unit and the calibration information, the computer program executes the computer in a process comprising:

(a) incorporating the image of the object;

(b) detecting a position of a pixel representative of the object in the image incorporated at process (a); and

(c) calculating the position of the object according to the direction and the displacement of the incident beam of light, which are derived from the calibration information with reference to the position of the pixel detected at process (b).

8. A method for generating calibration information comprising the steps of: projecting a beam of light on individual pixels of a camera image; according to the beam of light incident on each pixel, calculating a displacement from a reference point to the incident beam of light; and generating the calibration information by correlating a direction and the displacement of the incident beam of light with a position of each pixel.

9. A method for generating calibration information comprising the steps of: adjusting a first direction of a camera unit so that a first peak intensity of light emitted by a light source falls in a measurement pixel captured by the camera unit, and measuring a first relative position of the light source relative

to the camera unit;

adjusting a second direction of the camera unit so that a second peak intensity of light emitted by the light source falls in the measurement pixel, and measuring a second relative position of the light source relative to the camera unit;

repeating determination of an incident beam of light impinging on the measurement pixel according to the first and second relative positions for predetermined measurement pixels;

calculating a displacement from a reference point to the incident beam of light for each of the measurement pixels; and

generating the calibration information which correlates a direction and the displacement of the incident beam of light with each of the measurement pixels.